Nucleonica: Basic, Core and Advanced Applications
Training course with "Hands on" exercises, *To be held at the IRMM JRC Geel, Belgium*

Training Course / Nucleonica Overview

Dr. Joseph Magill,
Nucleonica GmbH,
Karlsruhe

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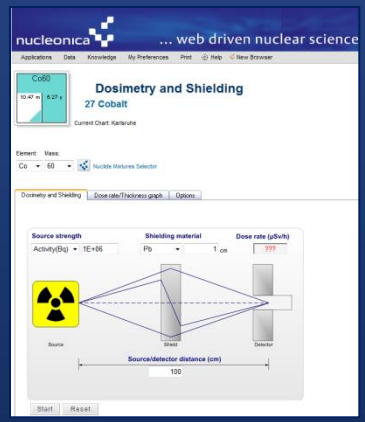
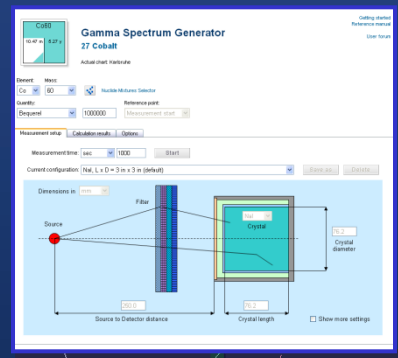
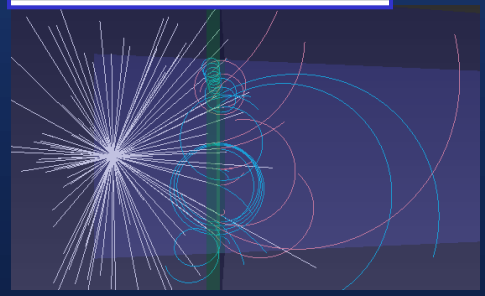
Nucleonica: Web-based Software Tools for Simulation and Analysis

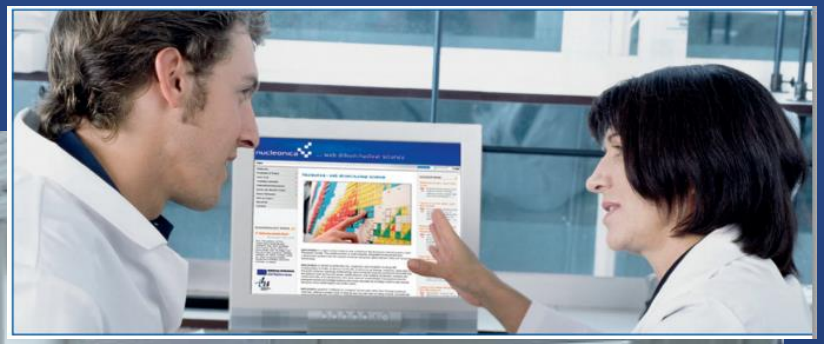
- Nuclear Data Resources in Nucleonica
- Nuclear Science Applications & Tools
  - Decay Engine
  - Dosimetry & Shielding
  - Virtual Cloud Chamber
  - Gamma Spectrum Generator
  - webKORIGEN
  - e-Ship
- Education & Training with Nucleonica
  - Nucleonica Mobile
  - Karlsruhe Nuclide Chart
- Knowledge Management with Nucleonica







Training courses...



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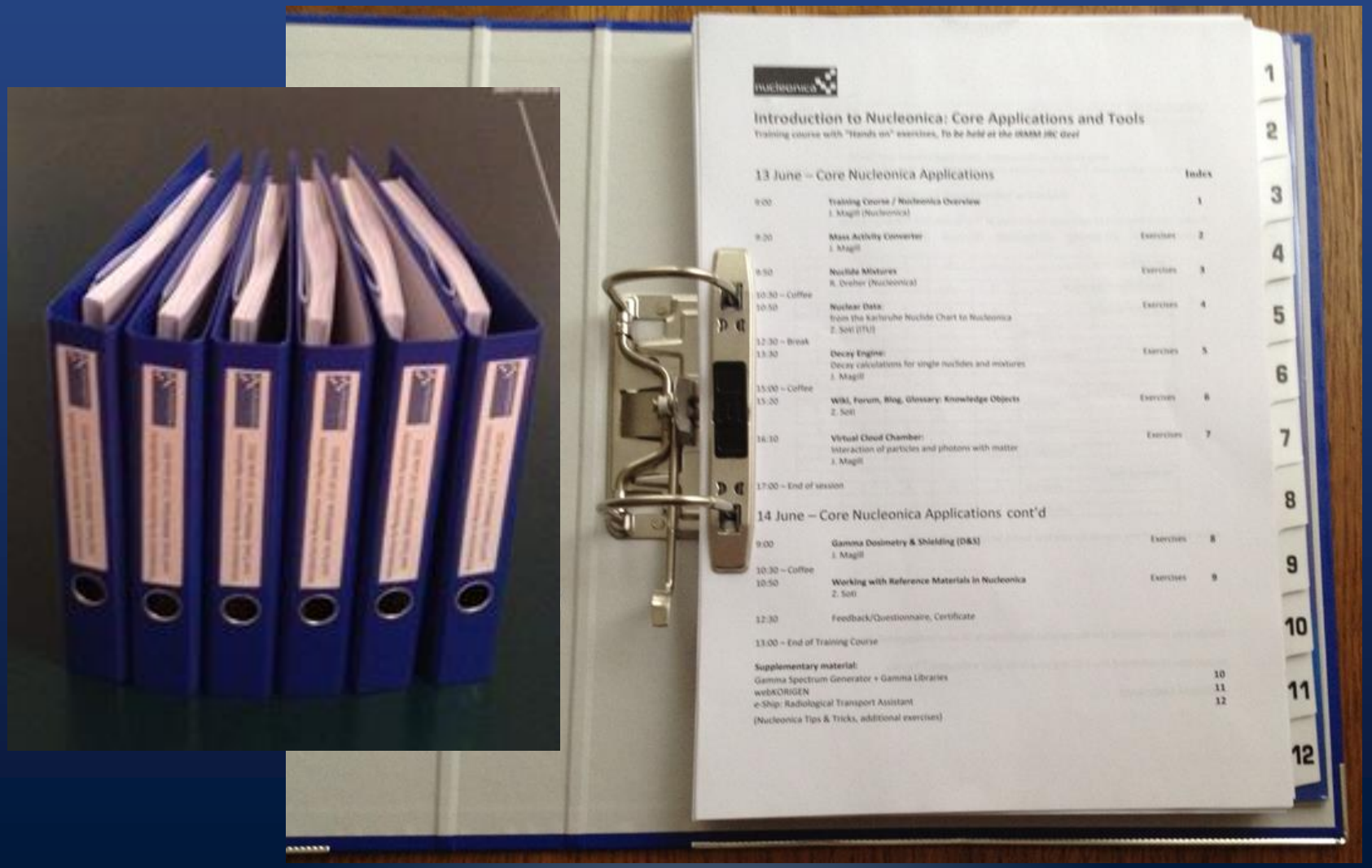
Course Folders…



Nucleonica: Basic, Core and Advanced Applications

Training course with "Hands on" exercises, *To be held at the IRMM JRC Geel, Belgium*

3 Oct. – Basic & Core Nucleonica Applications

			Index
9:00	**Training Course / Nucleonica Overview** J. Magill (Nucleonica)		1
9:30	**Mass Activity Converter** J. Magill	Exercises	2a
10:00	**Nuclide Mixtures** R. Dreher	Exercises	2b
10:30 – Coffee			
10:50	**Participants introduction**		
11:15	**Nuclear Data**: from the Karlsruhe Nuclide Chart to Nucleonica, Z. Soti (ITU)	Exercises	3
12:30 – Break			
13:30	**Decay Engine** J. Magill	Exercises	4
15:00 – Coffee			
15:20	**Virtual Cloud Chamber** J. Magill	Exercises	5
16:00	**Gamma Dosimetry & Shielding (D&S)** J. Magill	Exercises	6
17:00 – End of session			

4. Oct. – Advanced Nucleonica Applications

8:30	***e*-Ship: Radiological Transport Assistant** Y. Donjoux (CERN)	Exercises	7
10:00 – Coffee			
10:20	**webKORIGEN: nuclide depletion calculations** J. Zsigrai (ITU)	Exercises	8
11:20	**Gamma Spectrum Generator** J. Zsigrai	Exercises	9a
12:30 – Break			
13:30	**Gamma Libraries** J. Zsigrai	Exercises	9b
14:30	**Wiki, Forum, Blog, Glossary: Knowledge Objects** Z. Soti	Exercises	10
15:00 – Coffee			
15:20	**Working with Reference Materials in Nucleonica** Z. Soti	Exercises	11
16:00	**Nucleonica Tips & Tricks** J. Magill		
16:15	Feedback/Questionnaire, Certificate		
16:30 – End of Training Course			
Supplementary material (additional exercises)			12

These lectures are vailable online:
http://www.nucleonica.com/wiki/index.php?title=Training_Course_Proceedings

Links to the presentations:

- go to wiki on main Nucleonica page

- click on Training Courses

- at bottom of page click on Training Course Proceedings

Oct. 2013 Geel, Belgium [edit]

Nucleonica: Basic, Core and Advanced Applications and Tools, 3-4 Oct. JRC IRMM Geel, Belgium, 2013.

This 2-day training course took place at the JRC's Instituite for Reference Materials and Measurements (IRMM) in Geel, Belgium during the 3-4 October 2013. The course focused mainly on the Nucleonica Basic, Core and Advanced Applications and tools. A detailed description of nuclear data with particular reference to the various Nucleonica nuclear databases was given. Core applications were demonstrated through the use of Nucleonica tools such as the Decay Engine, and Dosimetry and Shielding. Special emphasis was placed on the Virtual Cloud Chamber application for radiation protection studies and investigating the interaction of charged particles and photons with matter. A case study on Working with Reference Materials showed how the various Nucleonica modules could be combined to fully characterize reference nuclear materials. Key lectures were given by Dr. Jozsef Zsigrai (ITU) on webKORIGEN, the Gamma Spectrum Generator and Gamma libraries and Mr. Yann Donjoux (CERN) on the e-Ship++ radiological transport assistant applications in Nucleonica.

Speakers included Mr. Y. Donjoux (CERN), Dr. Z. Soti and Dr. J. Zsigrai from the JRC/ITU, in addition to Dr. J. Magill and Mr. R. Dreher from the Nucleonica team.

Nucleonica: Basic, Core and Advanced Applications and Tools training course at JRC Geel, Belgium, October 2013

Agenda October 2013

Meet the Trainers for this course

Links to the presentations (to be updated before the course):

Nucleonica Overview (J. Magill)

Mass Activity Converter (J. Magill)

Nuclide Mixtures (R. Dreher)

Nuclear Data: from the Karlsruhe Nuclide Chart to Nucleonica (Z. Sóti)

Decay Engine (J. Magill)

Nucleonica Knowledge Objects: Wiki, Blog, Forum, Glossary (Z. Sóti)

Virtual Cloud Chamber (J. Magill)

Gamma Dosimetry & Shielding (J. Magill)

Working with Reference Materials in Nucleonica (Z. Sóti)

Nucleonica Tips & Tricks (J. Magill)

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How can Nucleonica help you?

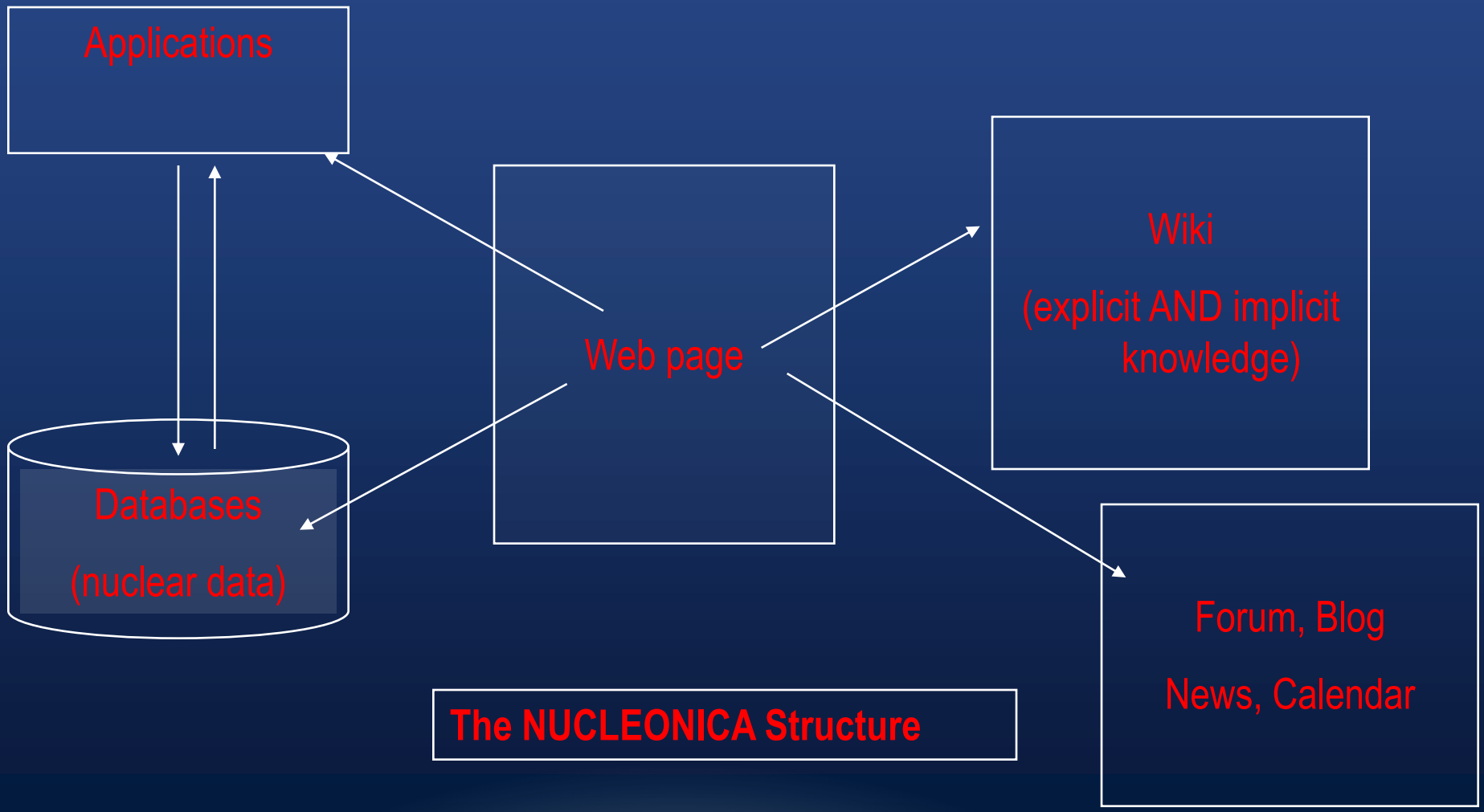
- Nucleonica provides you with user friendly access to the latest reference data from internationally evaluated nuclear data.
- A unique feature is the wide range of validated web-based nuclear science applications for decay calculations, dosimetry & shielding, gamma spectrometry, etc.
- In addition Nucleonica offers a range of introductory and advanced training courses in various areas of nuclear science.

CERN · PAUL SCHERRER INSTITUT PSI · TRIUMF · Bundesamt für Strahlenschutz · JÜLICH FORSCHUNGSZENTRUM · SCK·CEN · WAK · HZB Helmholtz Zentrum Berlin

Nucleonica is already being used by thousands of scientists and students worldwide in over 92 countries. Due to its advanced IT features, user friendly and intuitive environment, the platform has recently been endorsed by the Sustainable Nuclear Energy Technology Platform (www.snetp.eu):

"Nucleonica plays … an important role in making nuclear education more attractive and in building nuclear knowledge for a new generation of engineers and scientists"

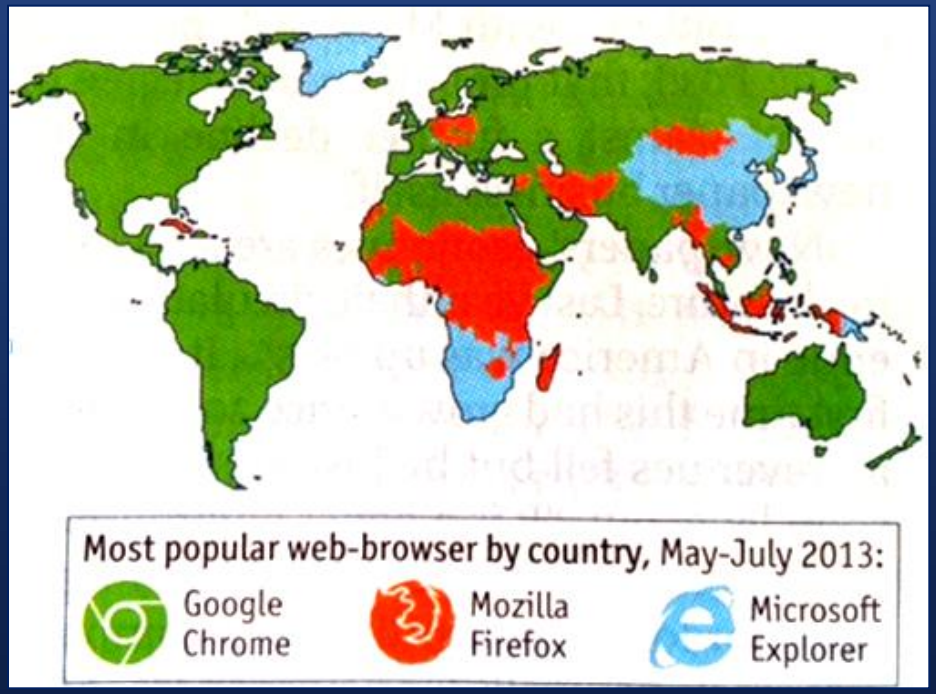
Nucleonica Architecture & Logical Structure…

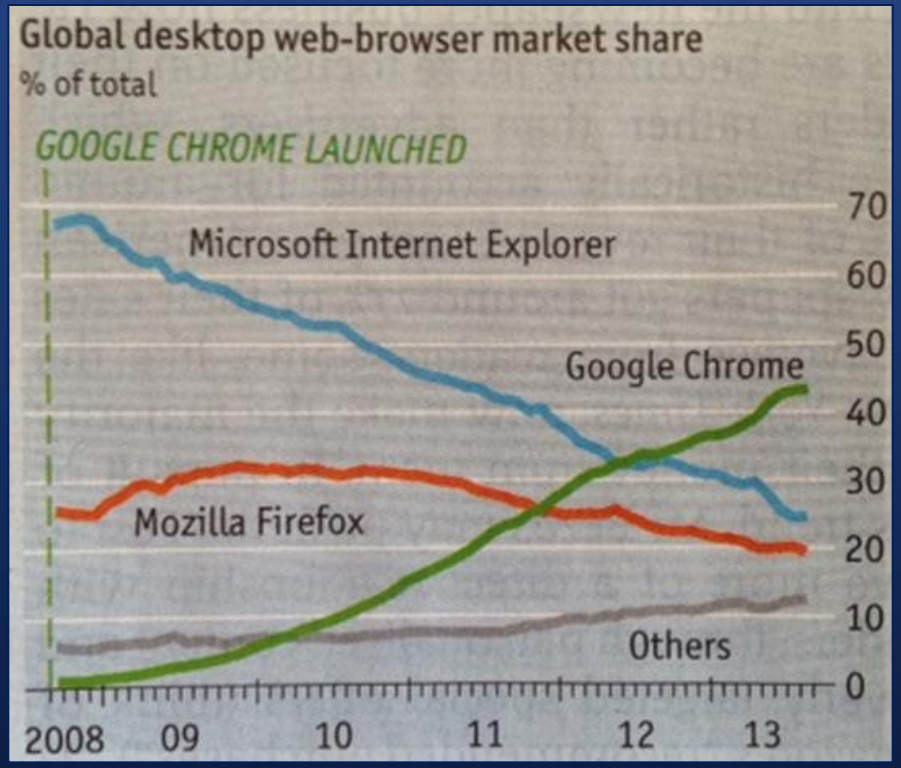


The NUCLEONICA Structure

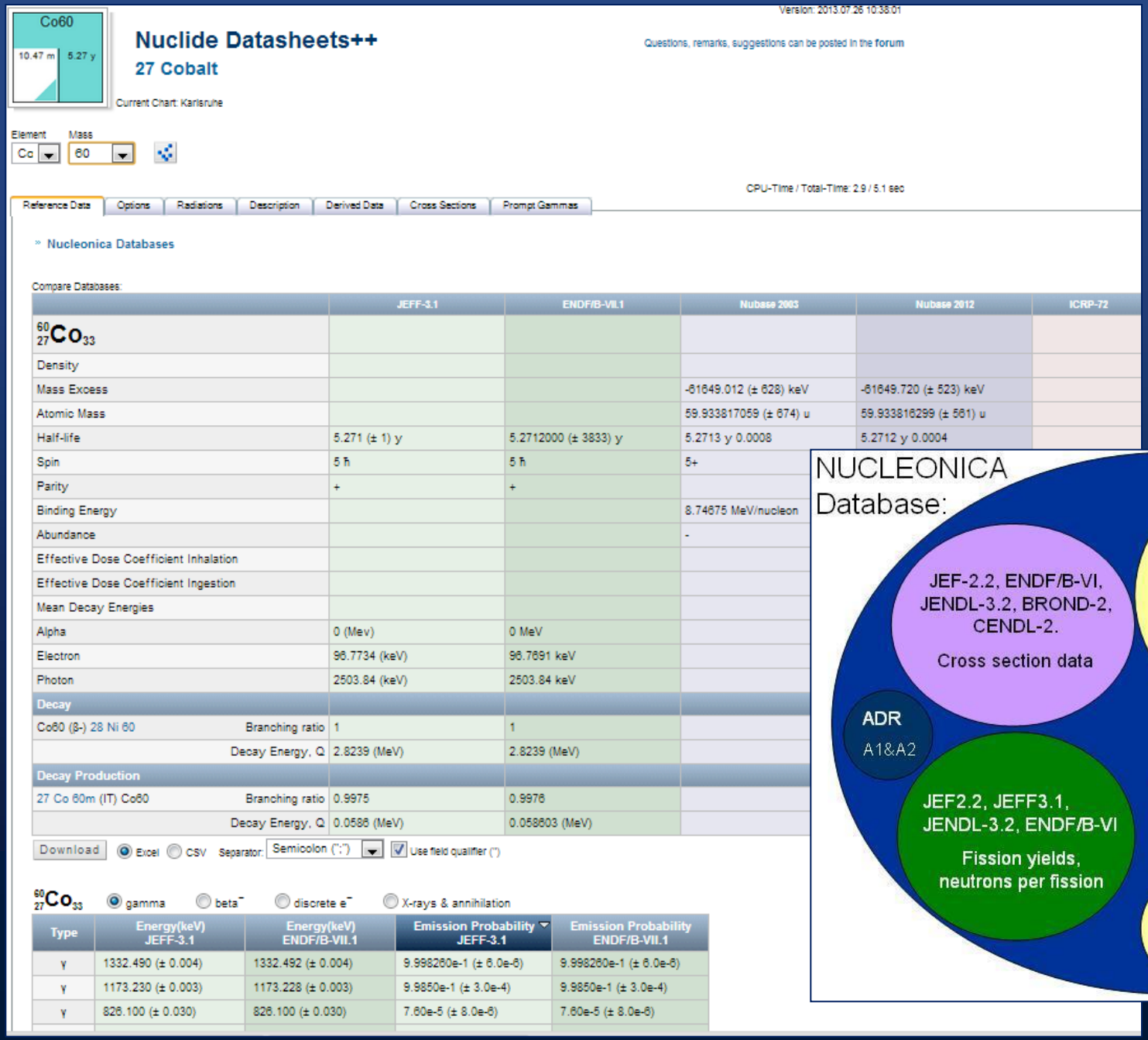
Which browser?

Nucleonica supports mainly Chrome, Firefox, and IE9, and Safari

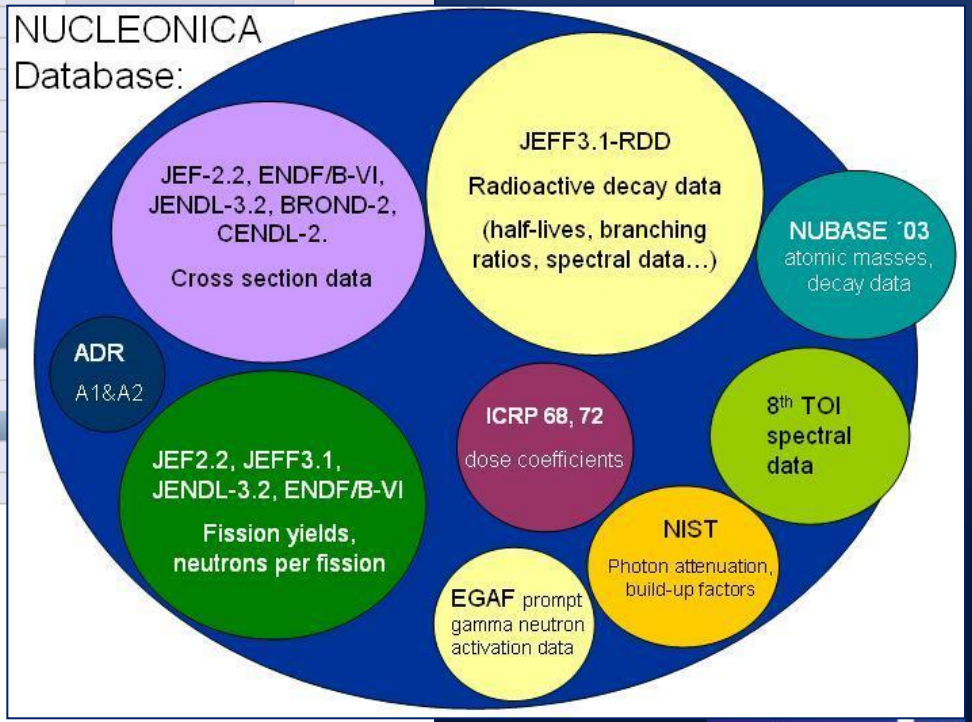




Nuclear Data Resources in Nucleonica: Nuclide Datasheets++



Main Nucleonica database JEFF3.1 contains decay data on 3852 nuclide.



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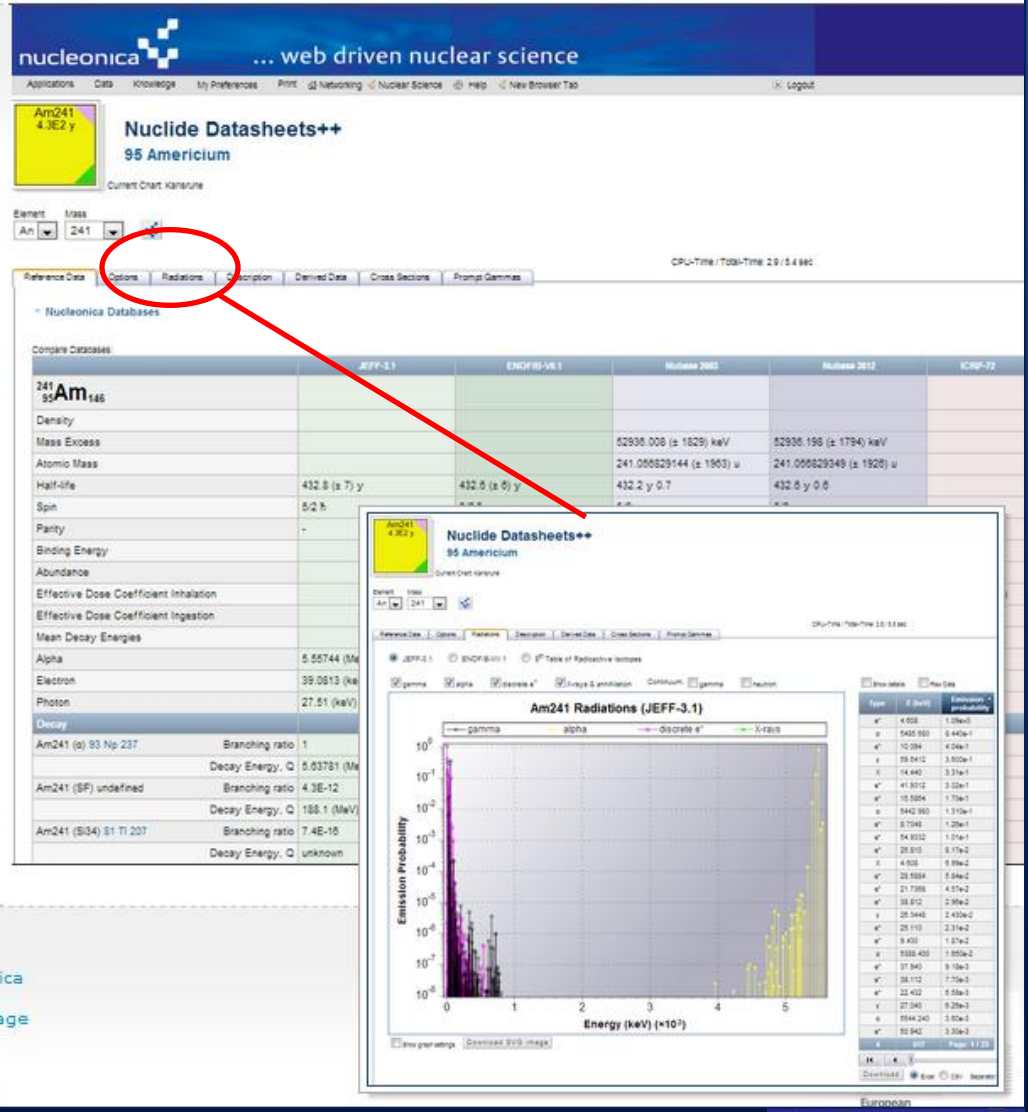
Nuclear Data Resources in Nucleonica:

Nuclide Datasheets++

nucleonica ... web driven nuclear science

User friendly access to internationally evaluated nuclear data with Nucleonica's Nuclide Datasheets++

- Nuclide Datasheets++ is an innovative user-friendly web-based application for displaying nuclear decay data from internationally evaluated data libraries such as JEFF3.1, ENDF/B-VII.1, etc. Through the use of filters, different types of spectral data (gamma, alpha, beta, etc.) from different sources can be compared.
- It is aimed at professionals for fast lookup of relevant nuclear data. Nuclide Datasheets++ is particularly suitable for education and training of young scientists, engineers and technicians in the nuclear domain.
- Datasheets++ is ideal for physicists, chemists, and technical experts from the nuclear industry, nuclear research organizations, universities, regulatory authorities and nuclear medicine institutes. It can be used in the fields of radiation protection, health physics, radiochemistry, nuclear waste characterization, decommissioning, nuclear security, nuclear forensics, nuclear medicine, etc.
- Register now for Free access to test the Datasheets++



Further information...

- More information on Nucleonica
- Nucleonica brochure
- Nuclide Datasheets++ wiki page
- Nucleonica Blog

Contact us at info@nucleonica.com

Validated Nuclear Science Applications & Tools

Decay Engine++

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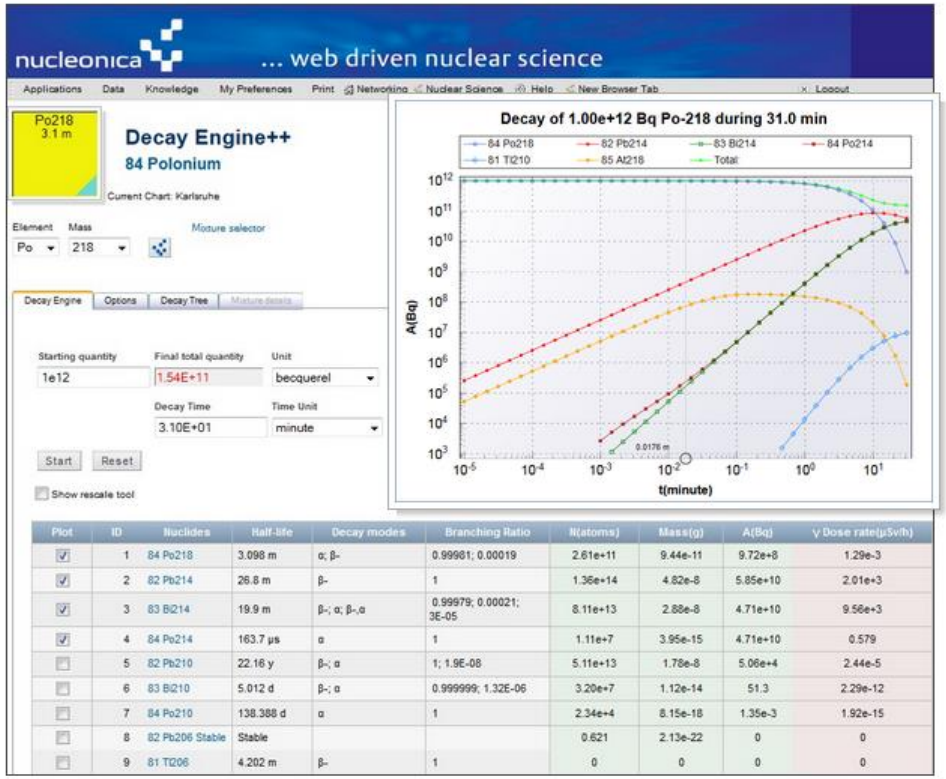
Radioactive Decay Calculations with Nucleonica's Decay Engine++

- Nucleonica's Decay Engine++ is an innovative user-friendly web-based application for investigating the radioactive decay of nuclides and nuclide mixtures. It is based on the exact mathematical solution to the Bateman equations.
- It is suitable for professionals for everyday calculations and for testing, validating and verifying complex computer models. The Decay Engine++ is particularly suitable for education and training of young scientists, engineers and technicians in the nuclear domain.
- Decay Engine++ is ideal for physicists, chemists, and technical experts from the nuclear industry, nuclear research organizations, universities, regulatory authorities and nuclear medicine institutes. It can be used in the fields of radiation protection, health physics, radiochemistry, nuclear waste characterization, decommissioning, nuclear security, nuclear forensics, nuclear medicine, etc.
- Register now for Free access to test the Decay Engine++



Plot	ID	Nuclides	Half-life	Decay modes	Branching Ratio	N(atoms)	Mass(g)	A(Bq)	γ Dose rate(μSv/h)
☑	1	84 Po218	3.098 m	α; β-	0.99981; 0.00019	2.61e+11	9.44e-11	9.72e+8	1.29e-3
☑	2	82 Pb214	26.8 m	β-	1	1.36e+14	4.82e-8	5.85e+10	2.01e+3
☑	3	83 Bi214	19.9 m	β-; α; β-,α	0.99979; 0.00021; 3E-05	8.11e+13	2.88e-8	4.71e+10	9.56e+3
☑	4	84 Po214	163.7 μs	α	1	1.11e+7	3.95e-15	4.71e+10	0.579
☐	5	82 Pb210	22.16 y	β-; α	1; 1.9E-08	5.11e+13	1.78e-8	5.06e+4	2.44e-5
☐	6	83 Bi210	5.012 d	β-; α	0.999999; 1.32E-06	3.20e+7	1.12e-14	51.3	2.29e-12
☐	7	84 Po210	138.388 d	α	1	2.34e+4	8.15e-18	1.35e-3	1.92e-15
☐	8	82 Pb206 Stable	Stable			0.621	2.13e-22	0	0
☐	9	81 Tl206	4.202 m	β-	1	0	0	0	0

Further information…

- More information on Nucleonica
- Nucleonica brochure
- Decay Engine++ wiki page
- Nucleonica Blog

Contact us at info@nucleonica.com

European Commission

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Dosimetry & Shielding++

Radiation dosimetry and shielding calculations with Nucleonica's Dosimetry & Shielding++

» Nucleonica's Dosimetry & Shielding++ is an innovative user-friendly web-based application for investigating the gamma dose rates from radioactive nuclides and nuclide mixtures based on the point source kernel method. More than 1300 gamma and X-ray emitting nuclides with 53,000 gamma and X-rays are available in the Nucleonica database, together with data for ten different shield materials and their associated buildup factors.

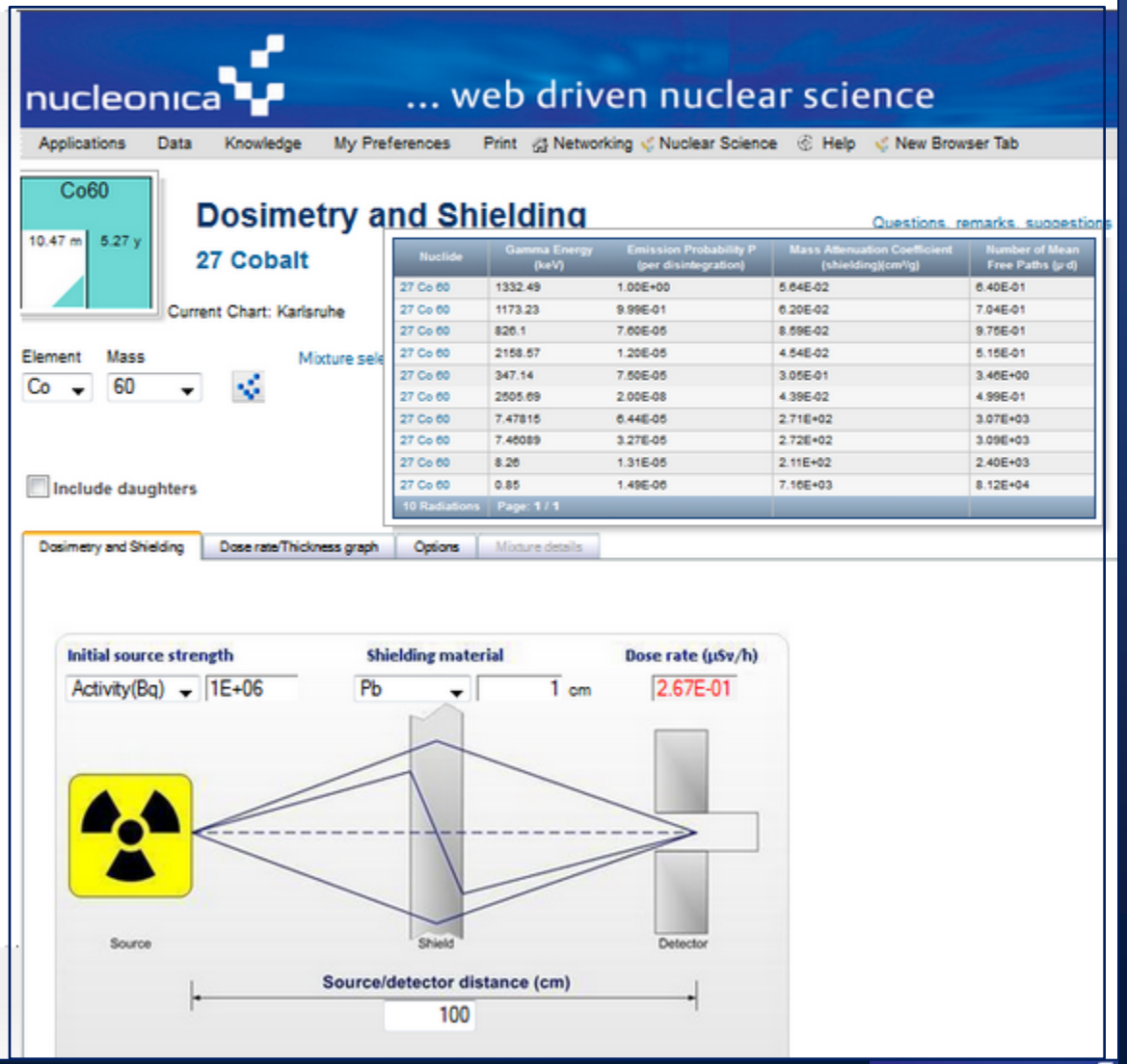
» It is suitable for professionals for everyday calculations and is suitable for education and training of young scientists, engineers and technicians in the nuclear domain.

» Dosimetry & Shielding++ is ideal for physicists, chemists, and technical experts from the nuclear industry, nuclear research organizations, universities, regulatory authorities and nuclear medicine institutes. It can be used in the fields of radiation protection, health physics, radiochemistry, nuclear waste characterization, decommissioning, nuclear security, nuclear forensics, nuclear medicine, etc.

» Register now for Free access to test the Dosimetry & Shielding++

Further information...

- More information on Nucleonica
- Nucleonica brochure



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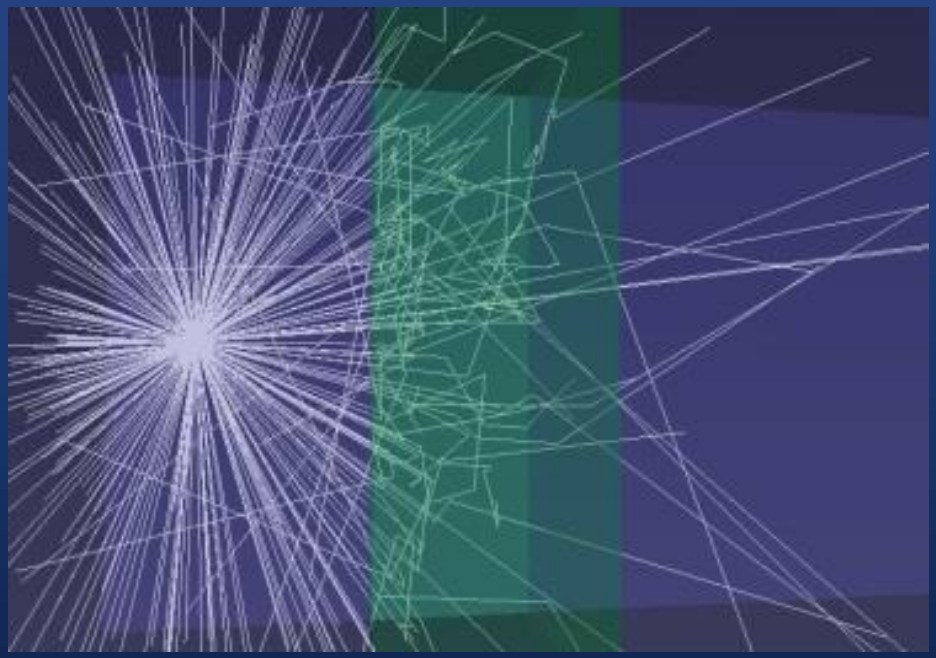
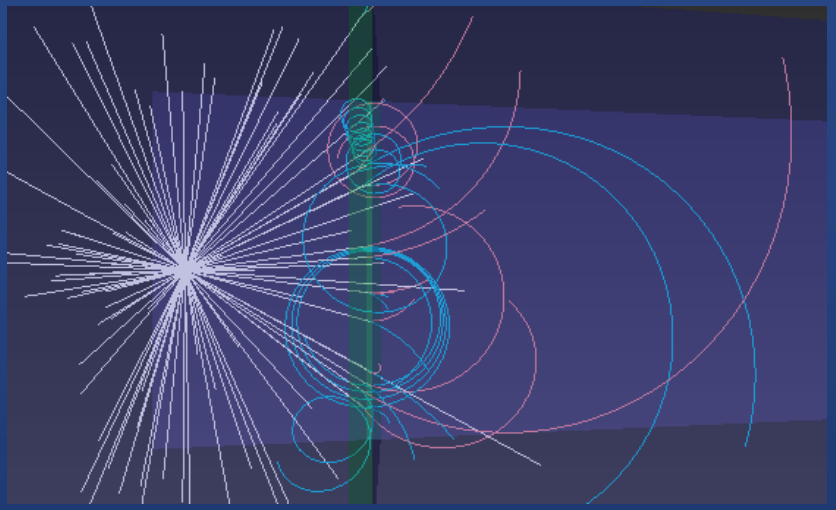
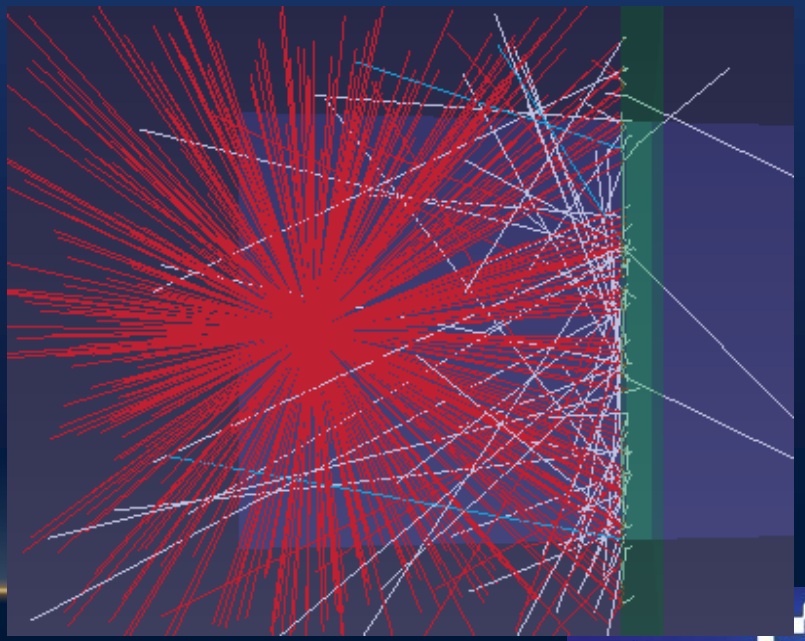
Virtual Cloud Chamber



low energy photons (energy 100 keV) are attenuated with a thick (15 cm) water shield. This combination of low energies and thick shields give rise to multiple scattering of the radiation



Electron-positron pairs are created using 10 MeV photons on lead. By “switching off” energy loss mechanisms, the charged particles are seen to spiral in the applied magnetic field.



The red particles (3 MeV positrons) are blocked by a lead shield (green). When the positrons collide with the shield, they combine with electrons (blue) to create gamma radiation (white). Only a few gamma photons pass through the shield material.

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Some animations made with the VCC

betas in air.mp4

Electrons-positrons_inBfield_VR.mp4

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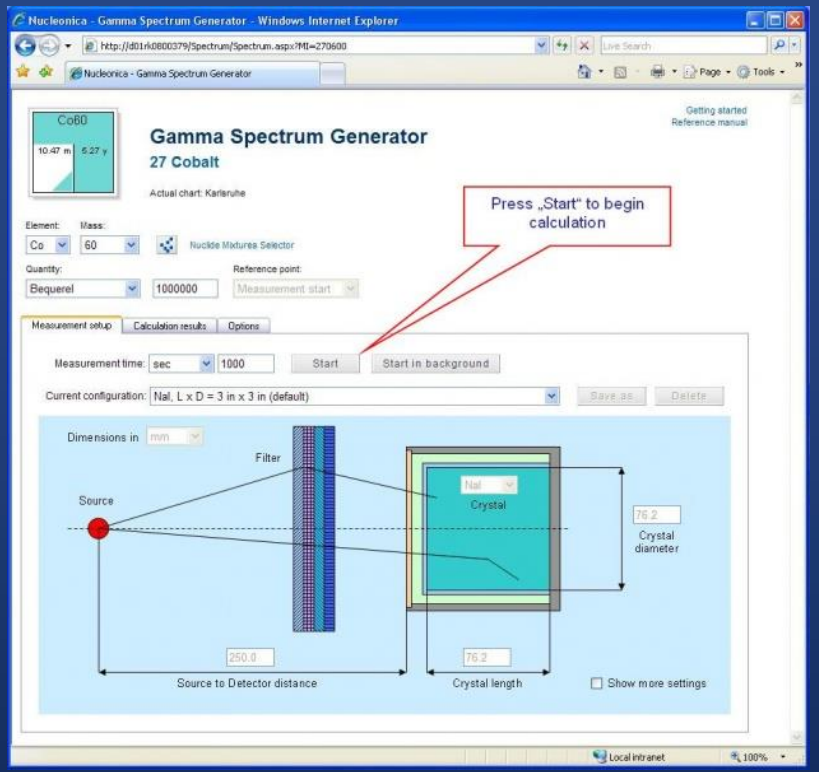
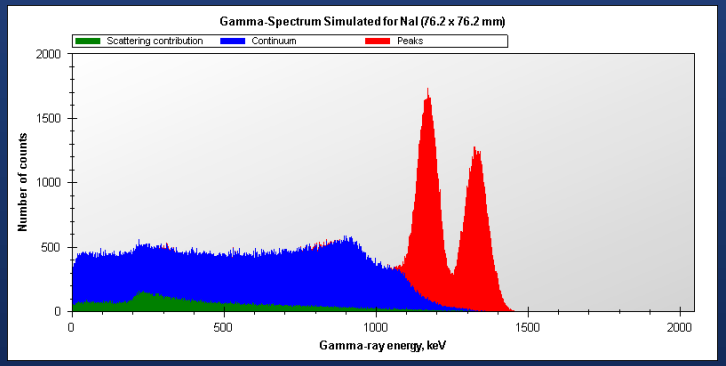
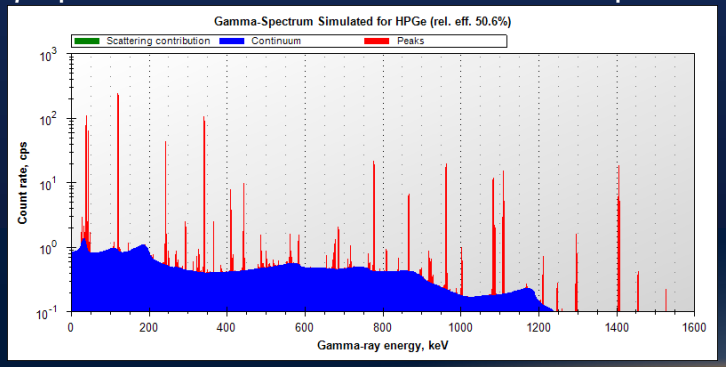
Gamma Spectrum Generator

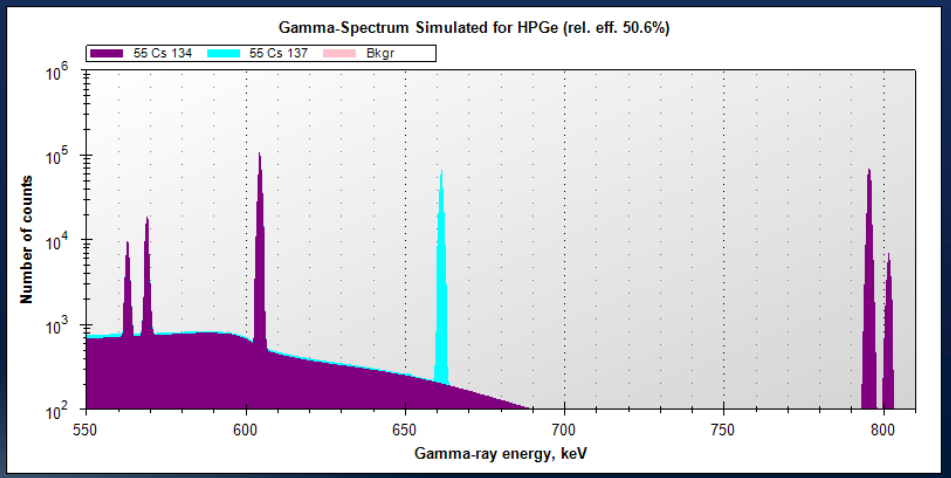


γ-spectrum simulated for ^{60}Co 100 kBq source and NaI (3" × 3") detector:



γ-spectrum simulated for ^{152}Eu 100 kBq source and HPGe detector.





Fukushima: Gamma spectrum of contamination at the Daiichi plant.
Contamination is almost entirely to cesium-137 and cesium -134

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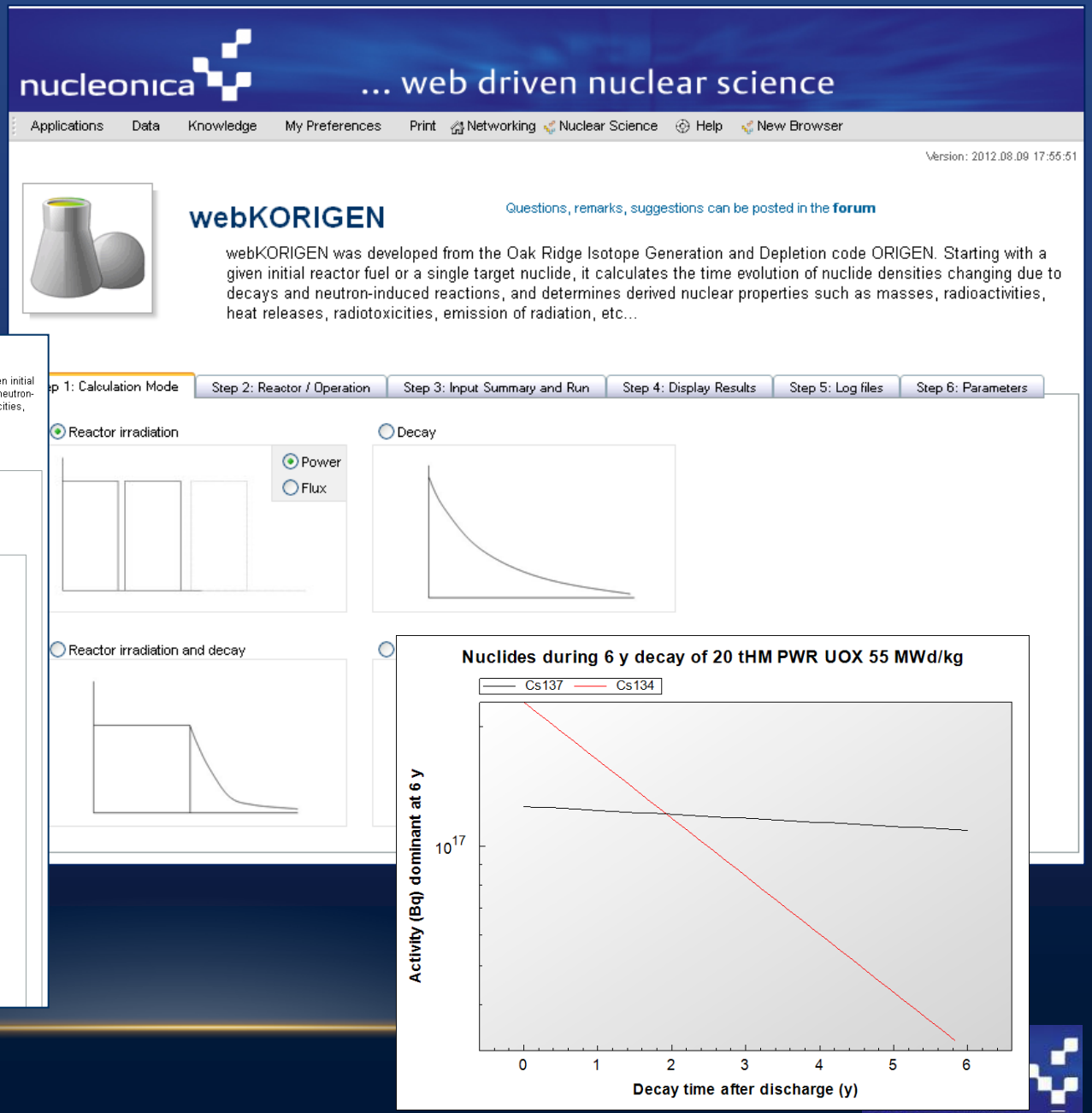
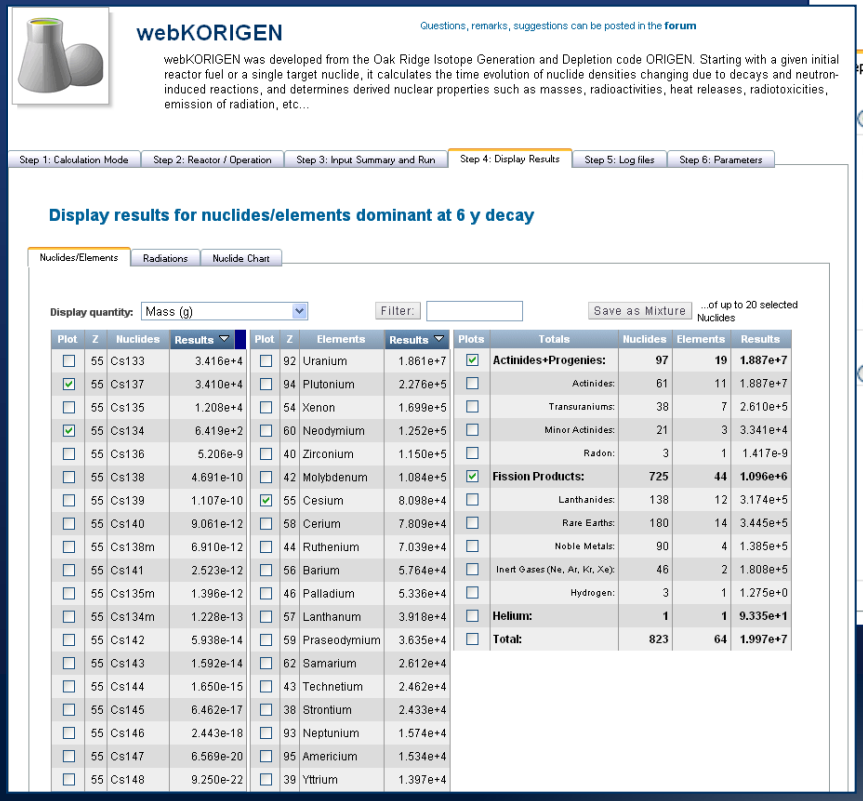
webKORIGEN

fuel depletion calculations
& neutron activation





Validated Nuclear Science Applications & Tools

e-Ship++:

package classification for radioactive transports

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Applications | Data | Knowledge | My Preferences | Print | Networking | Nuclear Science | Help | New Browser Tab | Logout

e-Ship++

radiological transport assistant

This is a *beta* version of the new web application *e-Ship++*.
Please report errors to info@nucleonica.com.

DISCLAIMER: this tool is a help to choose the package classification, please always refer to the country specific regulations.

My Packages | Edit | Options | Decay | Import | Activity limits | Swiss RPO | Sample packages | About e-Ship

User defined transport packages

Package Name	Mass (g)	Items	Content	Form	State	Activity reported	last modified	Download	Delete
(Create, import a new package)									
1g irradiated UOX fuel	1		Material	Other	Solid	2013.08.01 08:12:23	2013.08.01 08:12:23		
ISOLDE Target	25000		Material	Other	Solid	2013.04.14 17:28:38	2013.04.15 09:14:00		
Decayed: Sr83	1		Material	Other	Solid	2013.04.11 16:50:25	2013.04.11 16:53:37		
Spectro	1		Material	Other	Solid	2012.01.06 08:00:00	2012.08.22 13:11:36		
Irradiated sample using 26 GeV protons	1		Material	Other	Solid	2012.05.24 08:00:00	2012.08.22 12:35:15		
Irradiated sample (iron)	1		Material	Other	Solid	2012.02.27 08:00:00	2012.08.22 11:46:31		
Simple Package (Excepted)	1		Material	Other	Solid	2012.08.10 08:00:00	2012.08.22 11:23:31		
My 1st Package (Type A)	5		Material	Other	Solid	2012.08.03 08:00:00	2012.08.22 11:15:18		
My 1st Package (Excepted)	10		Material	Other	Solid	2012.08.02 08:00:00	2012.08.22 11:13:16		
My 1st Package (Exempted)	150		Material	Other	Solid	2012.08.01 08:00:00	2012.08.22 11:02:28		
Total: 10									

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e-Ship: nuclear material transport report

Transport report generated for source: Irradiated sample (iron) by iss1 iss1 on Aug 21, 2013 11:24:31
DISCLAIMER: this tool is a help to choose the package classification, please always refer to the country specific regulations

Package name: Irradiated sample (iron)
Description: Package created from CERN spectrum file. The activity was reported on 27.2.2012.

Package characterisation: Material, Other form, Solid
Host material mass: 1 g
Activity reported: Feb 27, 2012 08:00:00

Please take care of subsidiary risk.
Chemical form:
For the definition of the quantities used in this report see the Nucleonica Glossary

Source characterisation

Data extracted from Swiss RPO, Appendix 3, pages 65... from 1 January 2013.

Nuclide	Half-life	Activity (Bq)	Heat (W)	Ambient dose rate H_{10}(μSv/h) at 10 cm	E_{ing} (mSv)	E_{inh} (mSv)	A(Bq)/LE(Bq)	A(Bq/kg)/LE(Bq/kg)	A(Bq)/LA(Bq)	Radioactive contents	Notes
Be-7	53.22 d	3.11e+4	2.48e-10	2.49e-2	8.71e-4	1.71e-3	7.78e-2	7.78e+1	3.11e-4	(β/γ)	
Co-56	77.31 d	1.86e+2	1.11e-10	9.02e-3	4.65e-4	1.25e-3	4.65e-2	4.65e+1	1.86e-4	(β/γ)	
Co-57	271.80 d	1.02e+3	2.34e-11	2.14e-3	2.14e-4	1.02e-3	2.04e-2	2.04e+1	1.28e-4	(β/γ)	
Co-58	70.86 d	7.22e+2	1.17e-10	1.06e-2	5.34e-4	1.52e-3	7.22e-2	7.22e+1	2.41e-4	(β/γ)	
Co-60	5.271 y	1.19e+2	4.95e-11	4.36e-3	4.05e-4	3.69e-3	1.19e-1	1.19e+2	1.32e-3	(β/γ)	
Mn-54	312.13 d	7.86e+2	1.06e-10	9.90e-3	5.58e-4	1.18e-3	7.86e-2	7.86e+1	1.97e-4	(β/γ)	
Na-22	2.6027 y	5.25e+4	2.00e-8	1.73e+0	1.68e-1	6.83e-2	1.75e+1	1.75e+4	1.75e-2	(β/γ)	
Sc-46	83.79 d	2.24e+2	7.60e-11	6.70e-3	3.36e-4	1.52e-3	3.20e-2	3.20e+1	2.24e-4	(β/γ)	
Ta-182	114.7 d	3.23e+2	7.75e-11	6.27e-3	4.85e-4	3.23e-3	4.61e-2	4.61e+1	4.61e-4	(α)	
Y-88	106.63 d	1.45e+2	6.27e-11	5.51e-3	1.89e-4	6.38e-4	1.81e-2	1.81e+1	7.25e-5	(β/γ)	
Total: 10		**8.71e+4**	**2.09e-8**	**1.81e+0**	**1.72e-1**	**8.40e-2**	**1.80e+1**	**1.80e+4**	**2.06e-2**		

Package characterisation

Data extracted from ADR Table of A_1, A_2 values, exemption limits and notes (pages 218...)

Nuclide	Activity (Bq)	A_2 (TBq)	Exempt (Bq)	Exempt (Bq/g)	Excepted (GBq)	A/A_2	A Exempt	A(Bq/g)/Exempt(Bq/g)	A Excepted
Be-7	3.11e+4	2.00e+1	1.00e+7	1.00e+3	2.00e+1	1.56e-9	3.11e-3	3.11e+1	1.56e-6
Co-56	1.86e+2	3.00e-1	1.00e+5	1.00e+1	3.00e-1	6.20e-10	1.86e-3	1.86e+1	6.20e-7
Co-57	1.02e+3	1.00e+1	1.00e+6	1.00e+2	1.00e+1	1.02e-10	1.02e-3	1.02e+1	1.02e-7
Co-58	7.22e+2	1.00e+0	1.00e+6	1.00e+1	1.00e+0	7.22e-10	7.22e-4	7.22e+1	7.22e-7
Co-60	1.19e+2	4.00e-1	1.00e+5	1.00e+1	4.00e-1	2.98e-10	1.19e-3	1.19e+1	2.98e-7
Mn-54	7.86e+2	1.00e+0	1.00e+6	1.00e+1	1.00e+0	7.86e-10	7.86e-4	7.86e+1	7.86e-7
Na-22	5.25e+4	5.00e-1	1.00e+6	1.00e+1	5.00e-1	1.05e-7	5.25e-2	5.25e+3	1.05e-4
Sc-46	2.24e+2	5.00e-1	1.00e+6	1.00e+1	5.00e-1	4.48e-10	2.24e-4	2.24e+1	4.48e-7
Ta-182	3.23e+2	5.00e-1	1.00e+4	1.00e+1	5.00e-1	6.46e-10	3.23e-2	3.23e+1	6.46e-7
Y-88	1.45e+2	4.00e-1	1.00e+6	1.00e+1	4.00e-1	3.63e-10	1.45e-4	1.45e+1	3.63e-7
Total: 10	**8.71e+4**					**1.11e-7**	**9.39e-2**	**5.54e+3**	**1.11e-4**

Package Exempt from regulation

This is a *beta* version of the new web application *e-Ship++*.
Please report errors to info@nucleonica.com.

DISCLAIMER: this tool is a help to choose the package classification, please always refer to the country specific regulations.

My Packages | Edit | Options | Decay | Import | Activity limits | Swiss RPO | Sample packages | About e-Ship

Name (ID=1203)
Irradiated sample (iron)
Chemical form (please take care of subsidiary risk):
Description:
Package created from CERN spectrum file.
The activity was reported on 27.2.2012.
Activity reported: 2012.02.27 08:00:00

Package characteristics
Content: Material / Instruments / Articles
Form: Other / Special
State: Solid / Liquid / Gas
Host material: 1 g

Nuclide	Activity A (Bq)	Mass (g)	Half-life	A_1 (TBq)	A_2 (TBq)	Excepted (GBq)	Exempt (Bq)	Exempt (Bq/g)	A/A_2	A Excepted	A (Bq)/Exempt(Bq)	A (Bq/g)/Exempt(Bq/g)
Be-7	3.11e+4	2.40e-12	53.22 d	20	20	20.0	1.00E+07	1.00E+03	1.55e-9	1.55e-6	3.11e-3	31.1
Co-56	186	1.66e-13	77.31 d	0.3	0.3	0.300	1.00E+05	1.00E+01	6.20e-10	6.20e-7	1.86e-3	18.6
Co-57	1.02e+3	3.27e-12	271.80 d	10	10	10.0	1.00E+06	1.00E+02	1.02e-10	1.02e-7	1.02e-3	10.2
Co-58	722	6.14e-13	70.86 d	1	1	1.00	1.00E+06	1.00E+01	7.22e-10	7.22e-7	7.22e-4	72.2
Co-60	119	2.84e-12	5.271 y	0.4	0.4	0.400	1.00E+05	1.00E+01	2.98e-10	2.98e-7	1.19e-3	11.9
Mn-54	786	2.74e-12	312.13 d	1	1	1.00	1.00E+06	1.00E+01	7.86e-10	7.86e-7	7.86e-4	78.6
Na-22	5.25e+4	2.27e-10	2.6027 y	0.5	0.5	0.500	1.00E+06	1.00E+01	1.05e-7	1.05e-4	5.25e-2	5.25e+3
Sc-46	224	1.79e-13	83.79 d	0.5	0.5	0.500	1.00E+06	1.00E+01	4.48e-10	4.48e-7	2.24e-4	22.4
Ta-182	323	1.40e-12	114.7 d	0.9	0.5	0.500	1.00E+04	1.00E+01	6.46e-10	6.46e-7	3.23e-2	32.3
Y-88	145	2.81e-13	106.63 d	0.4	0.4	0.400	1.00E+06	1.00E+01	3.62e-10	3.63e-7	1.45e-4	14.5
Total: 10	8.712e+4	2.409e-10							1.11e-7	1.11e-4	9.39e-2	5.54e+3

Element: Y | Mass: 88 | Property | Quantity: 145 | Unit: Becquerel | Update
Save Package | Reset | Cancel | Report

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Education & Training with Nucleonica

Nucleonica for Smartphones: and Tablet PCs: M-Learning

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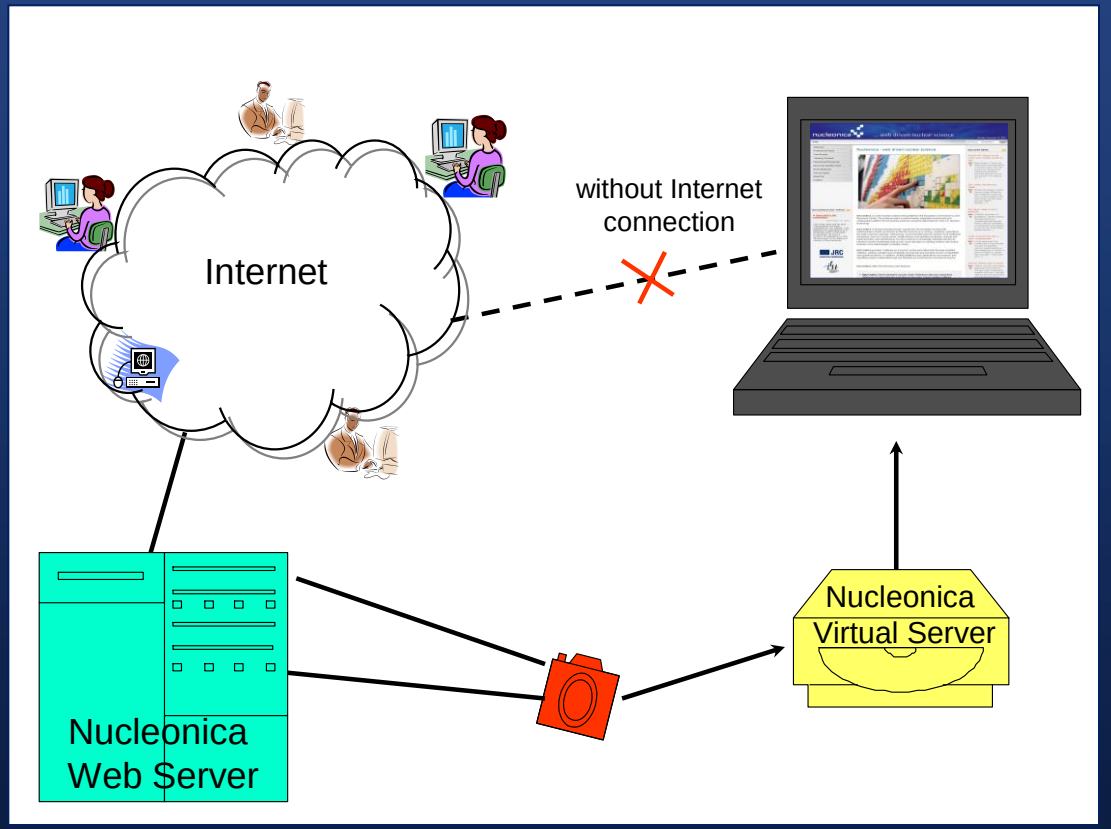
Standalone version of Nucleonica

- specially developed for mobile labs and field workers or for use on Notebooks/PCs where an internet connection cannot be guaranteed
- faster than internet version
- allows for more particles in Monte Carlo calculations than the internet version
- allows Monte Carlo dosimetry and shielding calculations (provided you have an MCNP license!)



Education & Training with Nucleonica

Karlsruhe Nuclide Chart

- Fold-out Chart
- Wall-Chart
- Auditorium Chart
- Nuclide Carpet

Nuclide „carpet“
1m x 6.5m

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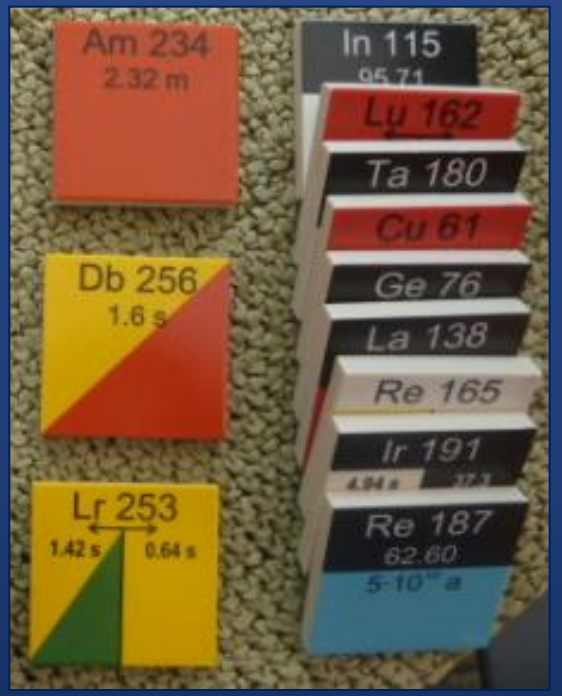
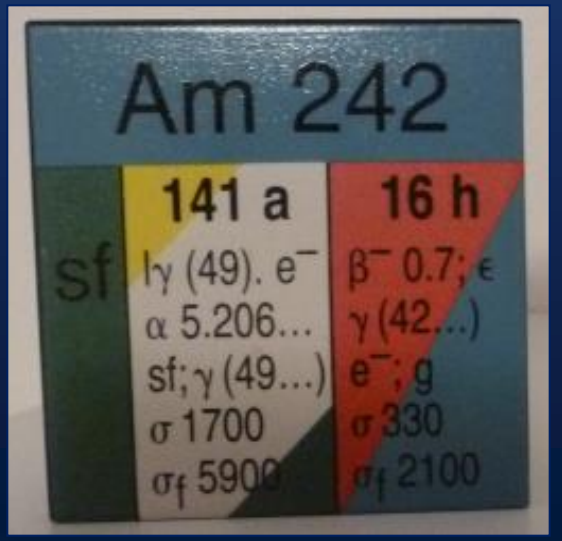
New Roll Map version of the Karlsruhe Nuclide Chart

with clamping rails and suspension system for easy mounting…

Unique mosaic tiles for the Institute for Transuranium Elements, Karlsruhe

15m x 7m





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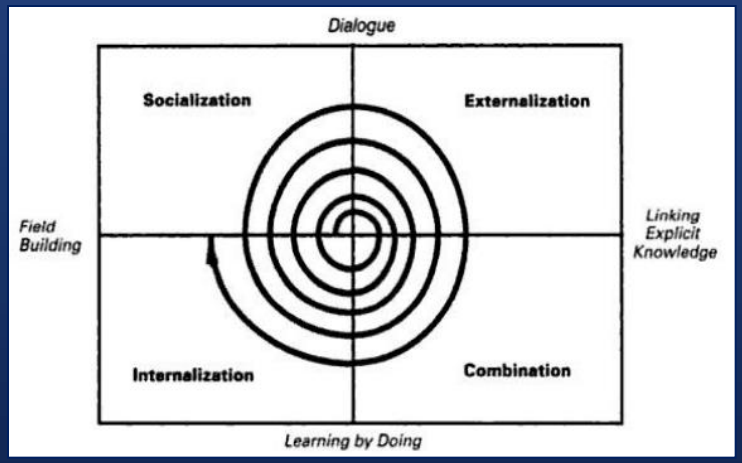
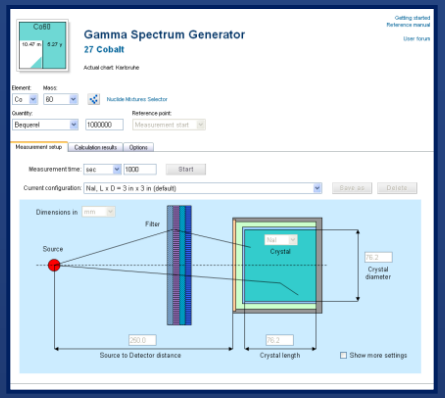
Knowledge Management with Nucleonica

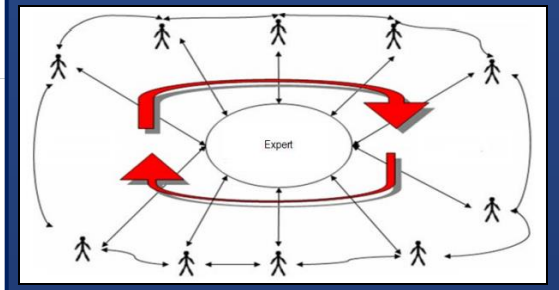
In this slide, the Nucleonica web portal is considered from a knowledge management perspective. Nonaka and Takeuchi have proposed the “knowledge spiral” (shown) in which there are four modes of knowledge conversion: socialization, externalization, combination and internalization (SECI model).



Socialisation: conversion of tacit knowledge to tacit knowledge e.g. an apprentice who works with tutor and learns from observing and imitating the tutor's actions. **Externalization:** conversion of tacit to explicit knowledge. **Combination** is the conversion of explicit to explicit knowledge. The process of systemizing already explicit knowledge into a knowledge system. **Internalization** is the conversion from explicit to tacit, which is closely related to “learning by doing”. At the end of the spiral process, one or more individuals in the organisation have acquired new tacit knowledge.

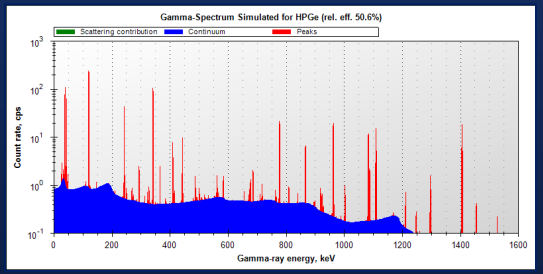


Socialisation: conversion of tacit knowledge to tacit knowledge



Externalization: conversion of tacit to explicit knowledge

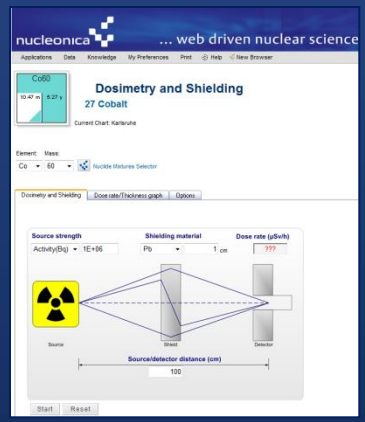
Combination: systemizing explicit knowledge

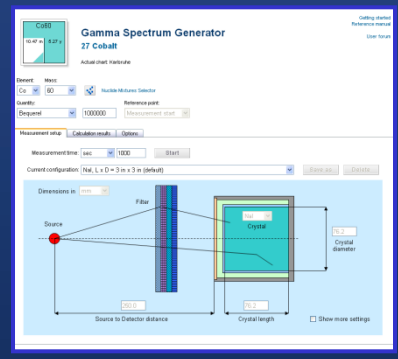


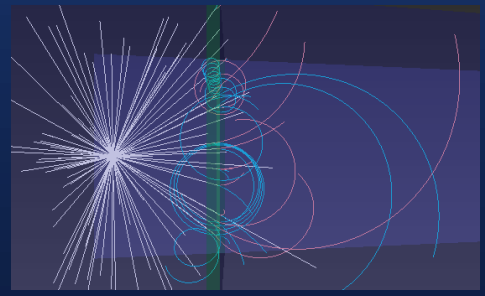
Internalization: conversion from explicit to tacit, triggered through “Learning by Doing”.

Nucleonica: Web-based Software Tools for Simulation and Analysis

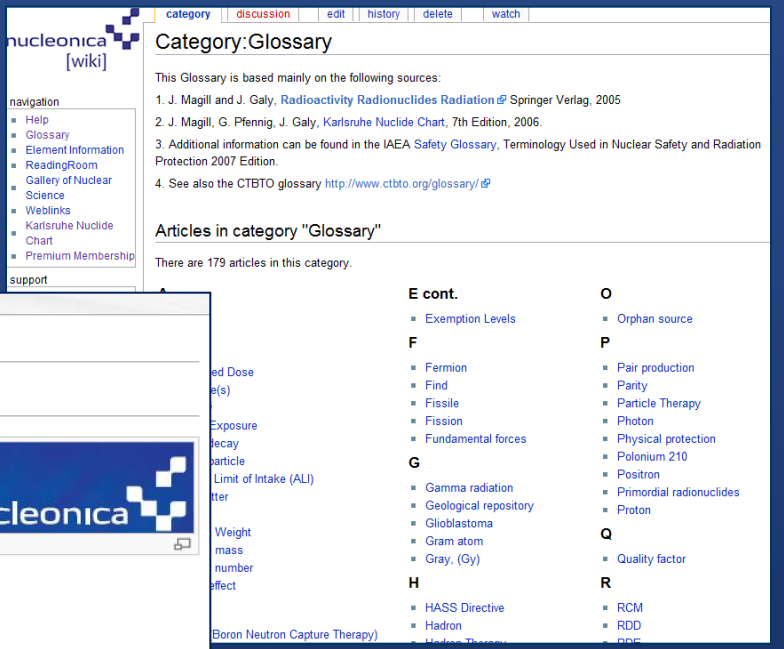
- Nuclear Data Resources in Nucleonica
- Nuclear Science Applications & Tools
  - Decay Engine
  - Dosimetry & Shielding
  - Virtual Cloud Chamber
  - Gamma Spectrum Generator
  - webKORIGEN
  - *e*-Ship
- Education & Training with Nucleonica
  - Nucleonica Mobile
  - Karlsruhe Nuclide Chart
- Knowledge Management with Nucleonica

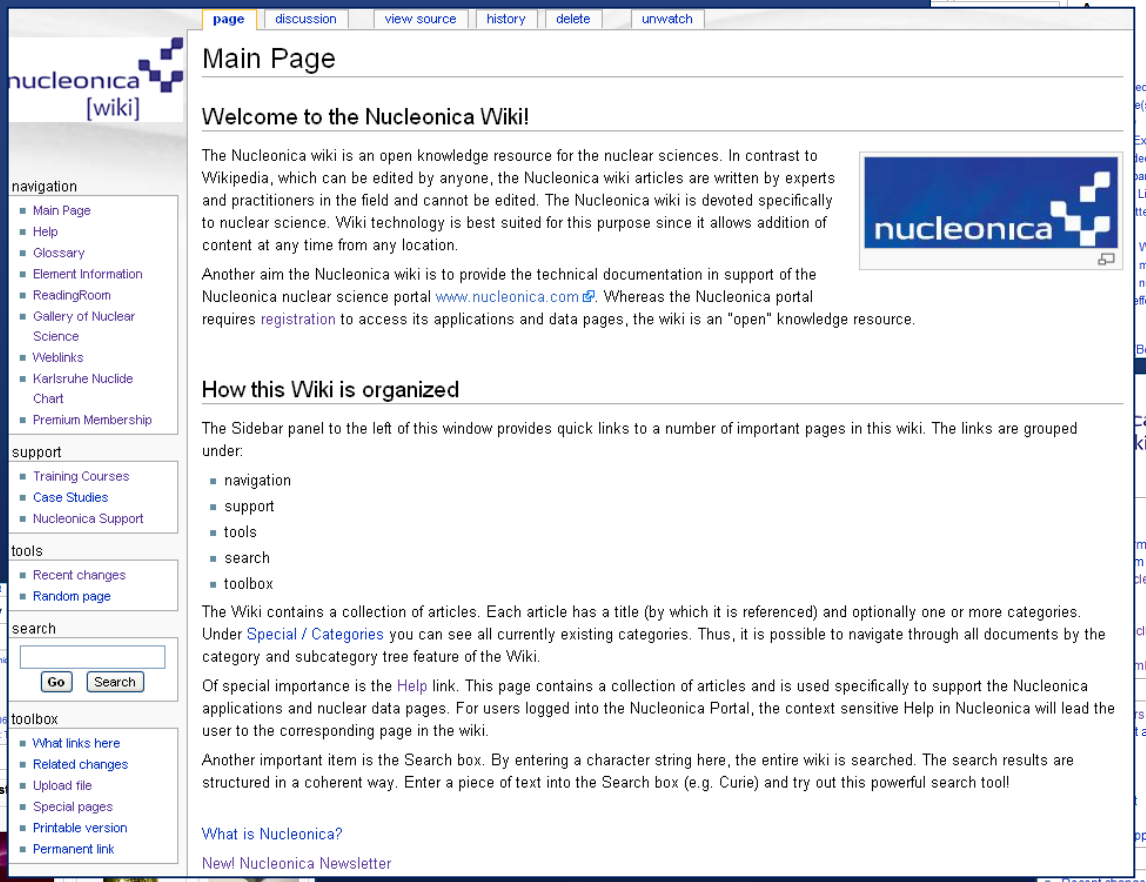


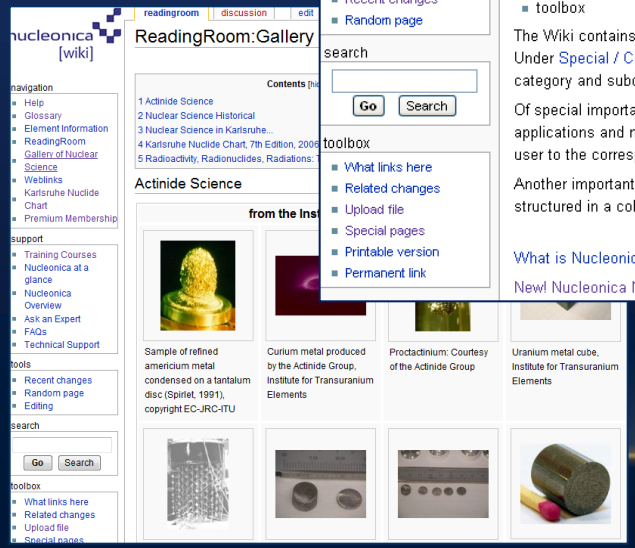


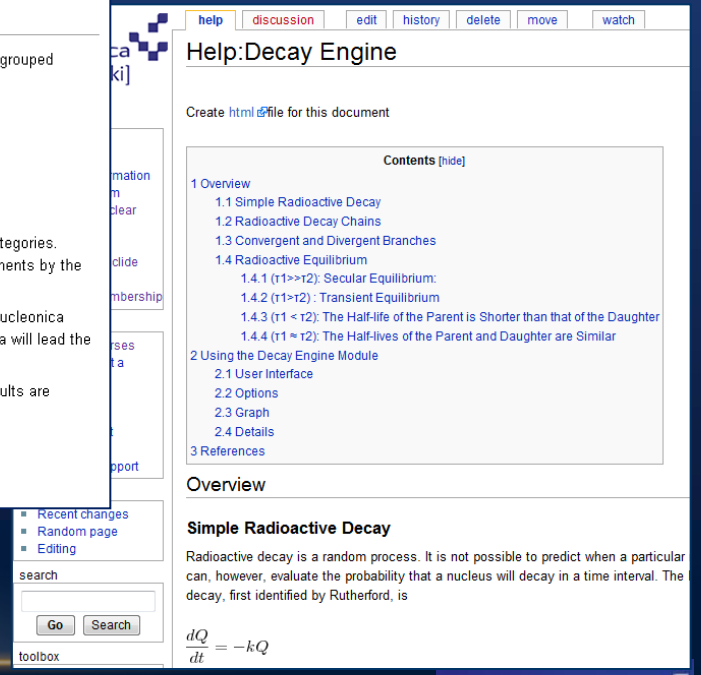


The Nucleonica Wiki…









The Nucleonica Blog…

Start of the Name Approval Process for the Elements of Atomic Number 114 and 116

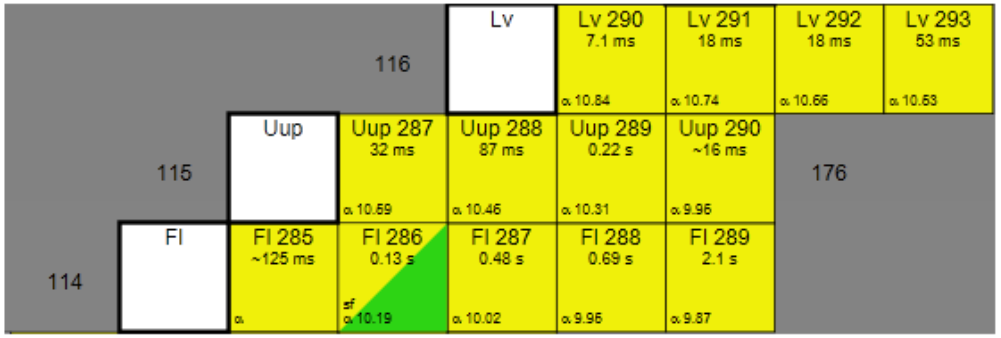
February 19th, 2012

by Joseph Magill

A joint IUPAC/IUPAP Working Party (JWP) has confirmed the discovery of the elements with atomic numbers 114 and 116. In accord with IUPAC procedures, the discoverers proposed names as follows: flerovium and symbol, Fl, for the element with Z = 114 and livermorium with the symbol Lv for the element with Z = 116. The Inorganic Chemistry Division recommended these proposals for acceptance.

Comments should be submitted by 30 April 2012. The text of the Provisional Recommendation can be downloaded from http://media.iupac.org/reports/provisional/abstract11/corish_300412.html.

Comments should be sent to Prof. John Corish at jcorish@tcd.ie.



Extract from the new 8th Edition (2012) of the Karlsruhe Nuclide Chart showing the isotopes of flerovium and livermorium.

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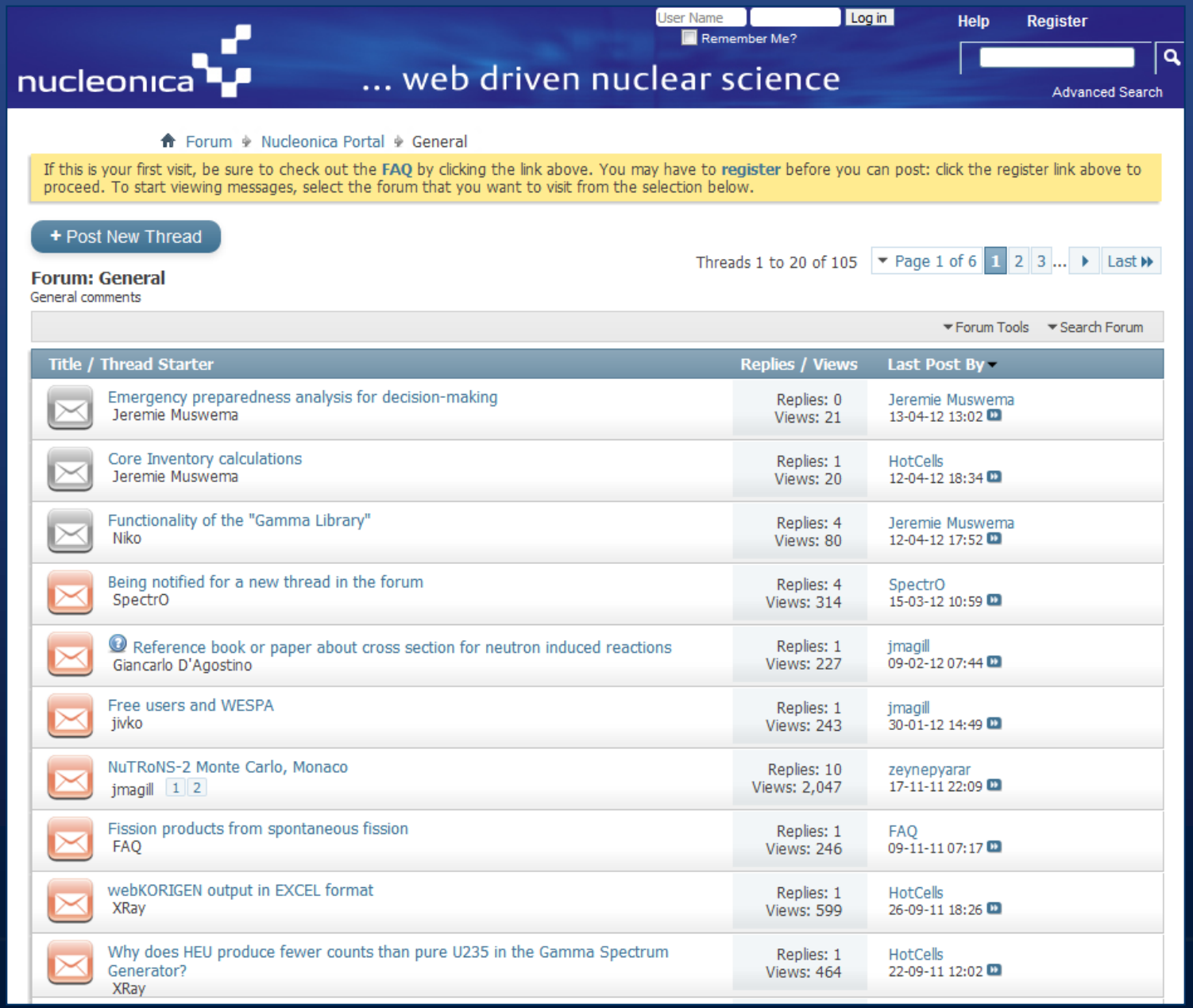
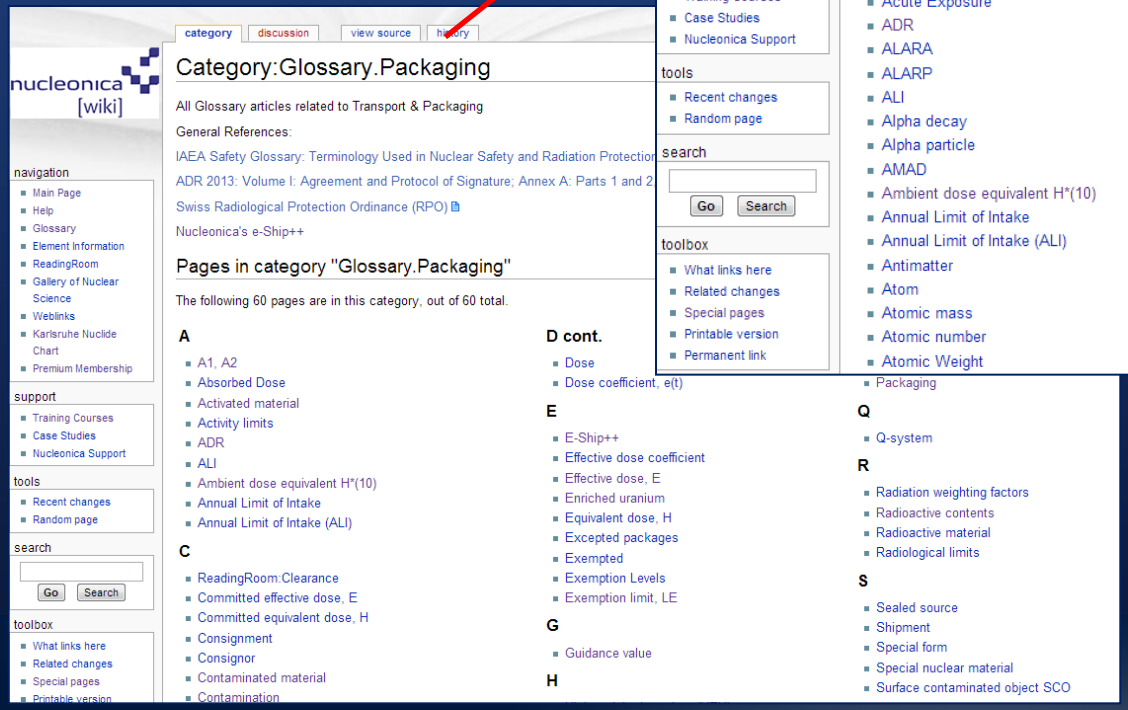
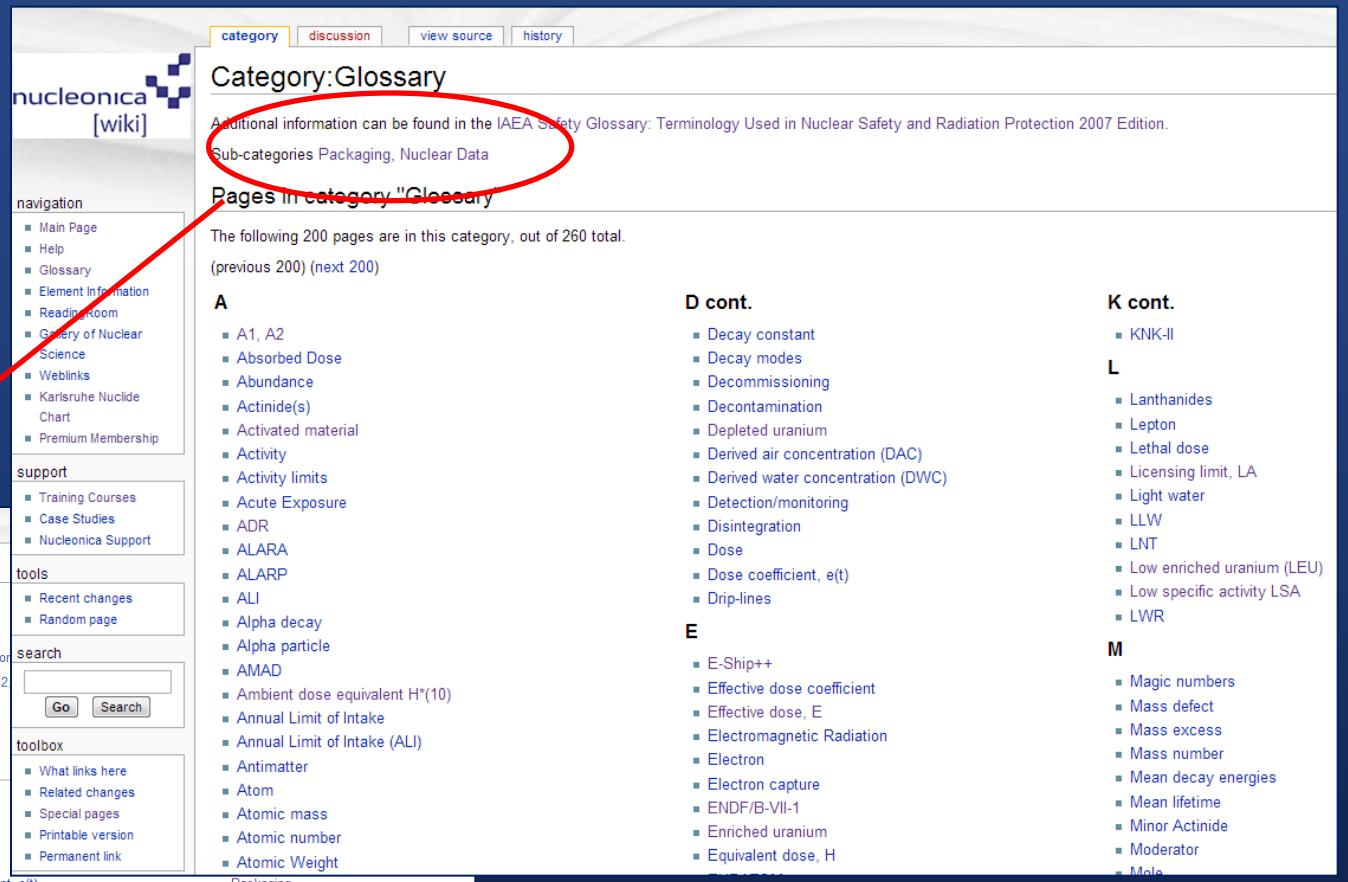
The Nucleonica Forum…



The Nucleonica Glossaries…





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Thank You!

Nucleonica: Tips & Tricks

1. Using browser tabs
2. Using the wiki context sensitive Help
3. Accessing the Nucleonica blog
4. Increase font size in your browser
5. Using the datagrid / slider conrol to re-arrange data
6. Increase the default size of graphs in your web browser
7. How to change your login username and password